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CURATING NASA'S ASTROMATERIALS COLLECTIONS: PAST, PRESENT, AND FUTURE

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Planning for the curation of samples from future sample return missions must begin during the initial planning stages of a mission. Waiting until the samples have been returned to Earth, or even when you begin to physically build the spacecraft is too late. A lack of proper planning could lead to irreversible contamination of the samples, which in turn would compromise the scientific integrity of the mission. For example, even though the Apollo missions first returned samples in 1969, planning for the curation facility began in the early 1960s, and construction of the Lunar Receiving Laboratory was completed in 1967. In addition to designing the receiving facility and laboratory that the samples will be characterized and stored in, there are many aspects of contamination that must be addressed during the planning and building of the spacecraft: planetary protection (both outbound and inbound); cataloging, documenting, and preserving the materials used to build spacecraft (also known as coupons); near real-time monitoring of the environment in which the spacecraft is being built using witness plates for critical aspects of contamination (known as contamination control); and long term monitoring and preservation of the environment in which the spacecraft is being built for most aspects of potential contamination through the use of witness plates (known as contamination knowledge). The OSIRIS REx asteroid sample return mission, currently being built, is dealing with all of these aspects of contamination in order to ensure they return the best preserved sample possible. Coupons and witness plates from OSIRIS REx are currently being studied and stored (for future studies) at the Johnson Space Center. Similarly, planning for the clean room facility at Johnson Space Center to house the OSIRIS-REx samples is well advanced, and construction of the facility should begin in early 2017 (despite a nominal 2023 return date for OSIRIS-REx samples). Similar development is being done, in concert with JAXA, for the return of Hayabusa 2 samples (nominally in 2020). We are also actively developing advanced techniques like cold curation and organically clean curation in anticipation of future sample return missions such as comet nucleus sample return and Mars sample return.

Keywords: Curation, Moon, Mission Planning, Apollo, Sample Return